CO50000-04976
data entry w/s U2
3/10

MACTEC

UIC - V 11706

RECEIVED
OCT 31 2002
EPA REGION VIII

October 29, 2002

42708, 25.7.2

Ms. Valois Shea
U.S. EPA Region 8
Underground Injection Control 8P2-W-GW
999 18th Street
Suite 500
Denver, Colorado 80202-2466

| UIC Class V File | | | | |
|---|---|---|---|---|
| UIC PERMIT & ID #: CO50000-04976 | | | | |
| Invent. Form | Inspect. Rep. | Monit. Reports | EPA Corres. | Operator Corres. |
| | | | | X |

**Baseline Groundwater Results – Nitrate, Bromide, and Phosphate**
**Corrective Measures Implementation**
**CDOT Region 6 Headquarters**
**2000 South Holly Street**
**Denver, Colorado**

Dear Ms. Shea:

On behalf of the Colorado Department of Transportation (CDOT), MACTEC Engineering and Consulting, Inc. (MEC) (f/k/a Harding ESE, Inc.) is providing updated information relevant to the Rule Authorization issued by your department for the CDOT Region 6 Headquarters (Site) groundwater remediation system. Baseline groundwater sampling, prior to the start-up of the CDPHE-approved remediation system, was conducted between September 9 and September 26, 2002. A total of 48 wells were sampled and MEC is now processing the laboratory analytical data from the groundwater samples. Specific to the Rule Authorization for the Site, MEC has prepared several maps that illustrate the distribution of nitrate and bromide in groundwater within the area of interest. Consistent with the Site characterization, the maps present the nitrate and bromide data with respect to the hydrostratigraphic zone in which the wells are completed – Upper Zone and Lower Zone.

The baseline nitrate concentrations (as N) are presented in Figures 1 and 2. In the Upper Zone (Figure 1), the baseline values for nitrate (as N) range from <0.2 (non-detect) to 53.2 milligrams per liter (mg/l). In the Lower Zone, the baseline values for nitrate (as N) range from 2.8 to 19.7 mg/l (Figure 2).

The baseline bromide concentrations are presented in Figures 3 and 4. Baseline values for bromide in the Upper Zone range from 0.56 to 6.3 mg/l (Figure 3) and in the Lower Zone they range from 1.0 to 10.8 mg/l.

Phosphate (as Orthophosphate) concentrations in baseline groundwater samples ranged from <0.1 (non-detect) to 0.48 mg/l.

Based on the nitrate and bromide concentrations observed in the baseline groundwater samples, the planned injection concentrations for nitrate and phosphate have been revised for actual remediation implementation. As noted in the approved Corrective Measures Work Plan, nitrate is the primary nutrient source for the enhanced bioremediation scheme and bromide is intended for use as a tracer to assess injection coverage within the contaminant plume. Because some baseline nitrate concentrations are in

MACTEC Engineering and Consulting, Inc.
1627 Cole Boulevard
Golden, CO 80401
303-292-5365 • Fax: 303-292-5411

excess of the 10 mg/l Maximum Contaminant Level (MCL), operation of the remediation system will commence using a reduced concentration of nitrate that will not exceed 10 mg/l. Because bromide has been detected in groundwater at the Site at concentrations as high as 10.8 mg/l, the effectiveness of bromide as a stand-alone tracer compound may not be definitive when tracking the influence of injection. Therefore, in addition to the planned concentration for Bromide injection during the first two weeks of system start-up (100 mg/l), the concentration of potassium phosphate to be injected will be increased to 2.0 mg/l. Phosphate is an essential nutrient in the microbial respiration process; however, because it is consumed in very minute quantities by microorganisms, phosphate can prove to be a highly effective tracer compound.

At start-up of the injection system, there will be two injection streams with different nutrient concentrations, a 'low concentration' stream and a 'high concentration' stream. The nutrient concentrations in each stream will be no greater than the following:

- Low Concentration Stream:
  - Ammonium Nitrate - 2.0 mg/l
  - Potassium Phosphate - 2.0 mg/l

- High Concentration Stream:
  - Ammonium Nitrate - 10 mg/l
  - Potassium Phosphate - 2.0 mg/l

The injection wells in the 'low concentration' network at start-up will initially include C-IW-1A, C-IW2A, C-IW2B, C-IW4A, C-IW4B, C-IW5A, C-IW6A, C-IW6B, C-IW7A, C-IW7B, C-IW8A, and C-IW9A. The injection wells in the 'high concentration' network will initially include C-IW3A, C-IW3B, C-IW10A, C-MW23, and C-MW16S. The injection wells have been designated to a particular concentration stream based on the concentrations for methylene chloride in baseline groundwater samples. MEC will forward the results for the chlorinated compounds identified in baseline groundwater samples as soon as a quality control review can be completed for that data.

Should you have any questions regarding the information presented or require additional information, please contact either Jon Wilken at (303) 293-6018 or Paul Weaverling at (303) 293-6156.

Sincerely,

**MACTEC Engineering and Consulting, Inc.**

Paul H. Weaverling
Project Manager

JKW/cgh
Shea-01

Attachments: Figure 1 – Background Nitrate Data – Upper Zone
Figure 2 – Background Nitrate Data – Lower Zone
Figure 3 – Background Bromide Data – Upper Zone
Figure 4 – Background Bromide Data – Lower Zone

cc: Theresa Santangelo-Dreiling – CDOT
Charles G. Johnson - CDPHE
CDOT Project file